powerful. Fodor's claim is premised on the condition that learning consists of hypothesis formation and confirmation, which is itself contentious. To contest it, however, one must offer an alternative, and this has proven difficult. The notion that autonomous systems must be built ultimately out of self-organizing systems, however, perhaps offers the foundation for building an alternative to Fodor's assumption. Self-organizing systems are able to construct richer structures than they start with (see Elman et al., 1996, for a suggestive account of cognitive development).

This points us to yet another contrast with the notion of mechanism adequate for nonliving systems. The engineering strategy, as we have seen, is to build more complex systems out of simpler components by imposing organization upon existing components. This is a very productive strategy, but it depends upon the capacity of the engineer to propose new forms of organization. Biological systems, however, cannot rely on external engineers. (Given natural selection, they can of course rely on selective retention of chance variation, but the generation of new useful modes of organization through chance variation of already evolved systems is extremely uncommon.) Current modes of organization in artifacts are usually located near local peaks on adaptive landscapes so that small variations are likely to be detrimental. Fortunately, however, biological systems can utilize a different approach. If biological systems are self-organizing, they are also capable of self-reorganization. This means that they can do more than impose a new organization on existing components. Insofar as these self-organizing capacities remain active and not frozen within the system, the system can also generate from within new components capable of performing new activities.

At present we have only limited models of such self-organizing of new components with new capacities within living systems. These include cases of plasticity in nervous systems. Nervous systems wire themselves and components emerge and take on specific functions partly as a result of the neurons that synapse on them. As a result, tissue which in a normally developing individual will serve visual processing tasks will, in a brain in which there are no inputs from eyes, take on the processing of auditory or other sensory inputs (Pascual-Leone & Hamilton, 2001). And areas in the somatosensory cortex that process information from fingers will reorganize if the input changes if, for example, an investigator binds together two digits so that they can no longer respond differentially (Merzenich et al., 1990). Although the details are less clear, such processes provide the most plausible explanation for the existence of an area in the brains of literate humans that has apparently become specialized for visual letter patterns (Petersen et al., 1990). Such a processing area could not have been specified in a genome when that genome was

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